MANITOBA RESEARCH COUNCIL

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MANITOBA RESEARCH COUNCIL

93-02664/

MANITOBA RESEARCH COUNCIL

ANNUAL REPORT

1991/92

LETTER FROM THE CHAIR

June 30, 1992

Honourable E. Stefanson
Minister
Industry, Trade and Tourism
Room 358 Legislative Building
Winnipeg, MB
R3C 0V8

Dear Mr. Stefanson:

I am pleased to submit for your consideration the Annual Report of the Manitoba Research Council for the fiscal year ended March 31, 1992.

Sincerely,

R. Hood

R. Hood
Chairman

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CORPORATE PROFILE

Working closely with industry, government and universities, the Manitoba Research Council (MRC) plays a lead role in encouraging and facilitating scientific research and technological development. As an agency of the Province of Manitoba, MRC also advises the government on developments in new technologies as they relate to the economic and social development of the province.

In its role as the Province's Science and Technology Advisory Council, MRC has prepared science and technology policy recommendations for consideration by the Province. In addition, MRC promotes science and technology awareness through involvement and financial support of several activities administered by other organizations.

Through its operating units, MRC assists industry in the development and implementation of appropriate technology. MRC provides food technology services from its facilities in Portage la Prairie and engineering and environmental monitoring and analytical chemistry services from its Winnipeg facilities. MRC has co-operative initiatives with the University of Manitoba in both the Mechanical Engineering Department and the Food Science Department.

INDUSTRIAL TECHNOLOGY CENTRE

- Advanced Manufacturing Technology
- Microgravity/Materials Research
- Electronic Design
- Equipment Retrofit
- Finite Element Analysis
- Mechanical Design
- Printed Circuit Board Layout
- Software Development
- Vibration Analysis
- Integrated Circuit Design
- Machine Design
- Materials Engineering
- Noise Analysis
- Physical Testing
- Prototyping
- Surface Mount Technology

ENVIRONMENTAL MONITORING AND ANALYTICAL CHEMISTRY
(W.M. Ward Laboratory, Winnipeg)

- Air Quality Monitoring
- Hazardous Waste Analysis
- PCB Analysis
- Environmental Chemistry
- Leachate Testing
- Trace Metals and Organics
- Security Analyses

NATIONAL AGRI-FOOD TECHNOLOGY CENTRE (Portage la Prairie)

- Product Feasibility Studies
- Ingredient Sourcing & Evaluation
- Recipe Development
- Colour, Viscosity & Texture Testing
- Quality Assurance Programs
- Plant Sanitation Audits
- Shelf-Life Studies
- Regulatory Compliance Assistance
- Product Formulation
- Consumer Preference Studies
- Process Development
- Test Market Production
- Nutrition Labelling Assistance
- Pesticide Residue Detection
- Chemical & Microbiological Assessments

TECHNICAL INFORMATION AND ADVISORY SERVICES
(Winnipeg and Portage la Prairie)

- Technology Transfer Services
- Computer Data Searching
- Information Sourcing
- Interlibrary Loans
- Literature Searches
- Technical Evaluations

CO-OPERATIVE INITIATIVES

- University of Manitoba
  - Advanced Industrial Materials Program
  - Institute for Technological Development
  - Agri-Food Biotechnology Program

- National Research Council of Canada
  - Industrial Research Assistance Program
  - Research Institute Support Program

CHAIRMAN'S REPORT

I am pleased to report on the success over the past year that the Manitoba Research Council has had in achieving fiscal and operational stability for its technical operations - the Industrial Technology Centre in Winnipeg and the National Agri-Food Technology Centre in Portage. The MRC began the year in some difficulty - management's plans for the fiscal year had been based on unrealistic expectations of revenues and financial support from our clients and the Province. The Council took firm corrective action in this regard, and with new management in place, directed tough steps to control costs, and to set a new course for the operations.

The Council developed and rigorously pursued an Action Plan that resulted in a balanced financial operation in 1991/92. Management systems were put in place to better control activities and finances. Important developments included: a strengthening of the profile of the food-related operations (rededication of the facility); steps to improve effectiveness of the environmental and analytical chemistry services through a merging with the Ward Lab facility; and steps to strengthen linkages with the National Research Council (which is now leading into the Advanced Manufacturing Technology initiative). MRC also made significant progress in improving relationships with private sector consultants and with provincial and federal government departments.

In the 1991/92 fiscal year MRC generated $1.6 Million in fee-for-service revenues, not including $660,000 from NRC. A total of 679 proposals were prepared by the centres. The total number of fee-for-service projects during 1991/92 was 532. The total number of clients was 490. Of these 414 were Manitoba firms.

Revenue generation, while an important indicator of activity levels, is not the best measure of MRC's success. Indeed MRC's job is to help others develop technical capabilities and self-sufficiency often including the development of service provision capabilities which could reduce MRC revenues. In fact it is through MRC's technical assistance and technology transfer activities (which have been an important but less visible aspect of MRC's operations since the Council's inception) that the most significant benefits to the provincial economy are achieved.

In recognition of the importance of these activities, steps were taken to initiate a benefits reporting system that is showing the reach and impact of the technical operations beyond fee-for-service activities. Over the 91/92 year a total of 760 substantive contacts were reported with Manitoba companies by MRC's technical staff. Many of these contacts involve the location, delivery and interpretation of technical and regulatory information, on a free-of-charge and confidential basis. The Centre's staff also spend significant time with entrepreneurs and small businesses providing business and market information, and acting as a "sounding board" for new product ideas and market opportunities.

When viewed from this holestic perspective, indications are that the returns and benefits from MRC's technical operations verify the merits of the province's support for these operations.

One of MRC's most significant achievements of the past year was the development of a position paper that outlined the restructuring of MRC into the Economic Innovation and Technology Council (EITC), announced by the Premier a short time ago. The document was forwarded on behalf of the Board to the Premiers Economic Advisory Council, who have accepted it in principle. EITC will have significant potential to have a positive impact on the economic wellbeing of Manitoba by providing a forum for industry, governnment, labour and the research community to identify the needs of industry and make recommendations for a long-term strategy to help the Manitoba economy take advantage of developing technologies.

These very positive results were achieved in a year wrought difficulties and uncertainty. On behalf of the Board, I would like to express our appreciation to all MRC staff for their hard work and support through this critical year of operations.

I also wish to acknowledge the commitment and dedication of all Board members in the past year. I wish to thank the following members who retired from the Board during the year: Mr. Dave Anton, Mr. Terry Clark, Mr. Hugh Eliasson, Mr. Gerald Gray, Ms. Susan Nemec-Hitesman, Ms. Irene Palmer and Mr. Fern Pitre.

In conclusion, on behalf of the Board, I wish to express our appreciation to the Honourable Eric Stefanson, Minister of Manitoba Industry Trade and Tourism for his guidance and support.

R. Hood
Chairman

MRC SERVICES

The Manitoba Research Council provides industry and government with technical information, advisory and contract services. The MRC's services and activities are designed to promote economic development through the adoption of appropriate technology by the private sector. Services include the sourcing of information on products, components and patents for local industry and entrepreneurs; the provision of advisory services to address specific technical problems facing industrial clients and conducting projects on a contract basis for industrial and government clients in Manitoba, other parts of Canada and the world.

MRC also assists companies in testing their products for compliance to many national and international standards and regulations. MRC is accredited by the Standards Council of Canada for a large range of mechanical, physical, chemical and metallurgical tests. Specialized testing programs can be developed to suit specified clients' needs.

INDUSTRIAL TECHNOLOGY CENTRE

The Manitoba Research Council provides engineering services to Manitoba, national and international clients, in product design, product development and testing from the Industrial Technology Centre (ITC) in Winnipeg. ITC capabilities in Advanced Manufacturing Technology include state-of-the-art computer-aided engineering. ITC helps industrial clients increase their efficiency and productivity and provides assistance at all stages of the product development cycle, from concept evaluation to test market launch. By using ITC's professional and integrated services in mechanical engineering, electronics, materials science and computer-aided engineering, Manitoba companies can become more competitive regionally, nationally and internationally.

Electronics Engineering

Electrical and electronics engineering provides design and product development assistance. Design services include electronic circuit design, printed circuit board design, communications systems design and industrial applications. Product development services include product selection assistance, product testing, evaluation and electronic retrofitting of manufacturing equipment.

Mechanical Engineering

Mechanical engineering provides specialized product design and analysis services. Technical capabilities include functional analysis, structural integrity assessments, system dynamics studies and evaluations of safety and cost effectiveness. Specialized services are available in vibration analysis, noise control, finite element analysis, solids modelling and computer-aided engineering.

ENVIRONMENTAL MONITORING AND ANALYTICAL CHEMISTRY

Located at the W.M. Ward Laboratory in Winnipeg, a wide range of chemical and environmental services are provided to industry. Capabilities include industrial and hazardous waste analysis, workplace air quality monitoring, fuels and lubricants testing, testing for hydrocarbons and other environmental contaminants, monitoring for sick building syndrome and troubleshooting quality control problems. These services help Manitoba companies comply with environmental and workplace health and safety legislation and also assist in solving production problems or in developing new technologies or products.

NATIONAL AGRI-FOOD TECHNOLOGY CENTRE (NAFTC)

The Manitoba Research Council provides food technology services to Manitoba, national and international food, feed and beverage industries through the NAFTC in Portage la Prairie. NAFTC provides clients with access to an integrated research, product development, testing and a pilot-scale production facility. It offers clients the expertise and experience of a dedicated team of food scientists, engineers, technicians and consultants, the resources clients need to develop new and better products, and more cost-effective production techniques.

Food Product Development

Product development activities range from turning an idea into a new food product to finding uses for by-products. Expertise and equipment are available to conduct flavour, colour and texture analyses as well as sensory evaluation to suit home, restaurant and institutional food requirements.

Food Engineering

Food engineering services include consulting assistance in process development and optimization, equipment specification and selection, plant layout and design, and energy conservation.

Pilot Plant

The pilot plant is equipped and serviced for production of new food products on a trial basis. Technical skills and equipment are available to assist with process development in the areas of dairy and meat products, fruit and vegetables, and cereal technology (including baking). Processing capabilities include cooking, blanching, freezing, battering and breading, drying and membrane separation. The pilot plant is Meat Hygiene Directorate inspected so test products containing meat can be distributed interprovincially and internationally.

Microbiology

Microbiological laboratories are equipped to evaluate food for spoilage and pathogenic organisms. Facilities for both enumeration and identification are available on site. Services also include consulting assistance in food plant sanitation and microbiological procedures.

Food and Analytical Chemistry

Analytical chemistry services range from routine protein, fat and moisture determination to sophisticated tests for trace constituents and contaminants, such as vitamins and pesticides. The laboratory has achieved Agriculture Canada accreditation for sulfathiazole residue in honey and for pesticide residues in fruits and vegetables and chemical analysis of milk powders and egg products.

TECHNICAL INFORMATION AND ADVISORY SERVICES

The Manitoba Research Council offers technical information and technological advice to Manitoba industry. This program includes information and advisory services funded by the Province and by two contribution agreements with the National Research Council of Canada for the delivery of the Industrial Research Assistance Program (IRAP); and the Research Institute Support Program (RISP). Through these services and programs, MRC helps industry solve technical problems, improve productivity and introduce new materials, equipment and technology.

There is no charge to industrial clients for services under this program. Available assistance includes: on-site technical problem definition and solution development; library services; literature and database sourcing; information on the availability of government assistance programs; demonstrations of PC and workstation-based CAD/CAM systems; and technical advice to the Regional Development Corporations and other government departments.

Information services are available through MRC's library facilities in Portage la Prairie and Winnipeg. These services provide industrial clients with access to extensive holdings of books, journals, catalogues, standards and government regulations. In addition, world-wide information is available through computer access to more than 300 technical databases. MRC's library staff assists clients in accessing these materials directly or through IRAP.

Typically, MRC libraries handle approximately 100 requests for information every month. Approximately 50% of these requests are from industry, 35% are from MRC staff on behalf of clients, and 15% are from government.

MRC - UNIVERSITY OF MANITOBA JOINT PROGRAMS

Institute for Technological Development (ITD)

The Institute for Technological Development is a co-operative venture among the Manitoba Research Council, the National Research Council, the University of Manitoba and Manitoba industry. The primary objectives of the ITD are to encourage communication between industry and university researchers, to facilitate technology transfer from the University to local industry, and to support co-operative R&D to improve the competitiveness of local industry. ITD performs a variety of technology transfer and networking activities to meet these goals.

Agri-Food Biotechnology Program

The Manitoba Research Council/University of Manitoba Agri-Food Biotechnology program is a co-operative venture between the Food Science Program Department and the Manitoba Research Council. The Agri-Food Biotechnology laboratories are located in the Food Science Department, University of Manitoba.

Dr. J. Zawistowski was appointed MRC/UofM Biotechnologist in November 1988. Since this time, the Program has developed to become strong both in the areas of applied research and development, and basic scientific research. The Program has received research grants from agencies such as NSERC, Agriculture Canada and the Western Grain Research Foundation.

During the fiscal year, 1991/92, the stature of the program has continued to grow in Canada and internationally. The Agri-Food Biotechnologist has presented a number of scientific papers at national and international conferences. As well, the Program has published in refereed international journals such as Biotechnology and Applied Biochemistry and Journal of Cereal Science.

Dr. Zawistowski plays an important role in the training of biotechnology students at the University of Manitoba, both at the graduate and undergraduate level. In 1991/92 the Program entered into the field of monoclonal antibody application to milk. This step represents an expansion of the Program's activities into the dairy sector.

Advanced Industrial Materials Program

The Advanced Industrial Materials (AIM) program has been mandated to pursue research and development of new materials and processes, to strengthen ties between the Faculty of Engineering and MRC for developing collaborative programs in research and teaching, assist local industry in fulfilling their needs in the area of materials engineering, and to foster R&D on the new frontiers of science and technology in the province.

During 1991-92 several R&D contracts from federal agencies such as the Canadian Space Agency (CSA) were completed, and a few additional contracts were proposed for further work through the collaborative efforts of MRC and the U of M. These contracts had both immediate and potentially long-lasting benefits for the Province. Specifically, program activities resulted in participation of local industry, training of students, creation of high tech jobs and the development of local expertise in new areas of materials science and technology. Research findings were published in journals and presented at international workshops in Tokyo and Moscow. Meetings and discussions were also held with Japanese scientists to initiate collaborative Manitoba-Japan research projects in microgravity.

MRC, in partnership with UMA Engineering Ltd. and AECL Pinawa, participated in preparing a proposal to the Canadian Space Agency for establishing a microgravity research facility (Drop Shaft) in Manitoba. It is expected the proposal will be submitted in June 1992. Significant technical support was also provided to the Department of Industry, Trade and Tourism towards the assessment and technical monitoring of the Dow Corning - Silicon Project which is currently underway in Selkirk, Manitoba. This support will be continued in 1992-93.

Several projects of a problem-solving nature were undertaken on behalf of Manitoba industries. Also, technical information on materials was provided to many companies. MRC staff (Dr. K. Tandon) offered undergraduate courses at the U of M, supervised graduate students, and provided support to the CSA in developing their long range plans for their materials science program. Dr. Tandon also initiated plans for delivering engineering seminars to Manitoba industries and undertaking contract R&D by MRC.

The program participated in the second phase ISTC contract with APRO's Advanced Industrial Materials (AIM) Network targeting small/medium-sized industries. The contract calls for promoting AIM research and development across Canada by conducting materials audit at a number of companies and by holding a seminar on AIM in each province. This activity will continue in 1992-93.

Through the AIM program, new R&D contracts worth $50,000 were brought into Manitoba during 1991-92, producing $39,000 of revenue for MRC. Also, R&D proposals worth $412,000 were submitted to the federal government in the past year; their outcome is being awaited during 1992-93.

1991/92 HIGHLIGHTS

INDUSTRIAL TECHNOLOGY CENTRE

- Commenced a project with Furniture West to enhance and improve the productivity and competitiveness of Manitoba furniture manufacturers. This project was sponsored by the National Research Council under its Industrial Research Assistance Program (IRAP).

- Evaluated the production processing capability of a cereal packaging machine. Operating improvements were implemented which increased output by approximately 40%.

- Developed a prototype sensor array on behalf of the National Research Council for electromagnetic testing of electronic circuit boards. This involved circuit design, board layout and prototyping for the array consisting of 4096 sensors.

- Designed and manufactured prototype facial toner units for use in beauty clinics. This included the hardware, software, system and packaging design and documentation to meet CSA requirements.

- A project continued for a shoe manufacturing company involving the retrofitting of the electronic control equipment for a pattern generating sewing machine; seven machines have been converted to date.

- A program to monitor three groundwater source heat pump installations in Manitoba was completed. This program was co-sponsored by the Canadian Electrical Association, Energy Mines and Resources Canada, Manitoba Energy and Mines and Manitoba Hydro.

- A contract research project aimed at developing suitable vibration criteria for purchasers of diesel electric generating sets larger than 100 kw capacity was continued on behalf of the Canadian Electrical Association and Manitoba Hydro.

- Design and analysis projects included: design, prototype manufacture and testing of tables used in physiotherapy and chiropractic applications; design and detail drafting for a low floor bus; design review for a sonic receiver; Finite Element Analysis (FEA) for building trusses in a wooden roof; FEA of a front swather leg assembly; FEA of roof purlins in an industrial building; garden tool attachment development and prototyping; and stress analysis on a bridge.

- A noise survey was undertaken for a paper mill. This included personal noise dose measurements for all job functions on all shifts and plant-wide noise mapping.

Industrial Technology Centre (continued)

- Testing projects included: The dynamic modelling and testing of a combine cab to reduce vibration; testing, data analysis, and fatigue evaluation of a swather; testing supports used in pole climbing applications; testing FRP materials used in bus components; monitoring of traffic noise in a residential sub-division; and noise reduction evaluation for an apartment building air conditioner unit.

ENVIRONMENTAL MONITORING AND ANALYTICAL CHEMISTRY

- Provided priority analytical services to a number of local consulting firms for hydrocarbon in soil testing to assist in compliance with environmental regulations.

- Provided occupational hygiene to a number of clients, including several pipeline welding operations, a pesticide packaging facility, banks, schools, a foundry, a metal recycling operation, an underground parking lot and a number of manufacturers.

- Leachate testing of a variety of materials to meet compliance with Manitoba Regulation 282/87, under the Dangerous Goods Handling and Transportation Act.

- Assisted a number of local companies and consulting firms by providing analytical services to determine environmental contaminants as a part of site assessments.

- Analysis of a tailings pond from a gold mine operation to determine if water quality met environmental guidelines.

- Provided several corporations with security evaluations of their products.

- Work in fuels and lubricants testing includes ongoing quality assurance testing of jet fuel, compressor oil, gasoline, and diesel fuel.

NATIONAL AGRI-FOOD TECHNOLOGY CENTRE

- An international fast food chain chose NAFTC to perform some critical product/process development work. Company personnel from Canada and elsewhere worked closely with NAFTC personnel on the development of several products. At the present time, one of the developed products is being test marketed in Canada.

- A Winnipeg-based dairy processor utilized NAFTC pilot plant equipment and personnel to further refine product practices and product quality. With product produced at NAFTC, the processor was able to perform test market studies in eastern and western Canada. This processor has since moved to a larger private sector processing facility in Winnipeg where production continues on a larger scale with some NAFTC equipment, instrumental to the process, transferred to assist the processor.

- A Winnipeg-based poultry processor was interested in establishing an on-site quality control laboratory. NAFTC provided the processor's quality assurance personnel with comprehensive lists of equipment and equipment suppliers to equip a microbiology laboratory. In addition, company personnel spent several days in NAFTC laboratories learning the proper techniques of spoilage and pathogenic organism analyses and enumeration.

- A number of shelf-life studies were performed for in- and out-of-province clients. These studies involved a number of food products, ranging from sea foods to horticultural products. In each case, the NAFTC client was able to evaluate shelf life as a function of packaging material and package gas composition.

- A rural Manitoba firm initiated an aquaculture operation. NAFTC provided important support for this fledgling operation in several ways including: provision of technical information through literature searches and contact with aquaculture experts; processing of the product and controlled storage of materials for the aquaculture operation.

- A Manitoba processor of specialty breads required testing to verify the shelf life of two bread varieties. These retail products are currently available in Manitoba.

- Sensory testing of five value-added meat products was conducted for a national marketing board. The board required an assessment of the products' quality changes during long-term storage to assist in the determination of the feasibility of production and marketing of the products by industry.

National Agri-Food Technology Centre (continued)

- Several flavour variations of a value-added poultry product were developed for a Manitoba processor wishing to expand its market. The company is successfully marketing the products to the foodservice trade and is planning on introducing the products to the retail market.

- Preliminary processing trials were conducted for a Manitoba food company to investigate the feasibility of adapting an ethnic food formulation and process to commercially-available equipment.

- Two national bakery companies used NAFTC facilities to provide short courses in bakery production and retailing.

- Production and packaging of several products for retail and foodservice sale took place during the year in the pilot plant: specialty bread, several ethnic food products,goats' milk, pizza crust and sauce, fish products, vegetable products, seasoning mixes, and chicken products.

- Honey from several producers in Manitoba and Saskatchewan was tested for antibiotic and bee repellant residues. Certification of compliance with residue limits is necessary to sell or export honey.

- Comprehensive testing for products of the Manitoba Liquor Control Commission continued, as main thrust of their quality control program.

- Received Agriculture Canada accreditation for agricultural chemical residues in fruits and vegetable and for proximate analysis of egg products.

- Vegetable producers and processors had products tested for agricultural chemical residues.

- Several companies had products tested and formatted to meet Consumer and Corporate Affairs Canada nutritional label information.

- Assisted a Manitoba Provincial department by providing agricultural chemical residue analysis on water.

- Assisted a local manufacturer in a research project to determine the effects of anti-oxidants on the storage stability of an oil.

- Assisted the Province in the emergency response to a major chemical spill in rural Manitoba.

TECHNICAL INFORMATION AND ADVISORY SERVICES

- A manufacturer of a new bottled beverage was experiencing separation and sedimentation in their product. The National Agri-Food Technology Centre conducted an extensive literature review and consulted industry experts to diagnose and solve the problem. In addition, preliminary tests conducted by NAFTC to identify the source of the sedimentation problem revealed that the product was potentially hazardous for human consumption. NAFTC recommended the processing changes required to produce a safe product.

- A local manufacturer of specialty candies recognized a significant opportunity to manufacture a traditional ribbon-type of Christmas candy. To accomplish this, the firm needed to find an effective way of forming the candy in a high speed production environment. The company contacted an ITA, who worked with them to develop some concepts that would form the basis of a new ribbon candy-forming machine. The ITA continued to work with the company and a local fabricator to design and build a machine which was put into production and performs very well.

- A food processor considering the development of a new value-added poultry product was faced with raw material costs prohibitive to the viability of marketing the product. NAFTC advised them on a processing technique that significantly lowered their raw materials costs, making the production and sale of the new product economically feasible. NAFTC also lent the company the equipment for production trials to confirm the process and raw material costs.

- The owner of a small rural welding and machine shop, wanting to reduce the company's dependence on repair work, decided to manufacture a "walker" for disabled persons. An ITA worked with the company throughout the development process, providing assistance and information in areas such as product design, material selection, component fabrication methods and component sourcing. With the subsequent help of an IRAP-L the company was able to engage a technical consultant to design some of the fabrication tooling. The company has recently begun shipping the new product and anticipates selling 1500 units the first year.

- A local custom metals parts fabricator recognized a need to train shop and supervisory employees in the principles of geometric dimensioning and tolerancing. The company tried unsuccessfully for a period of time to identify local skills and/or individuals who could do the training. On a regular call to the company the ITA identified this need, and within 24 hours was able to: identify a source at a local community college which had done similar training and was willing to assist the company; other sources for this training (and video training programs); provide an estimate of costs; and identify a government manpower training program which might be able to offset some of the costs. The company subsequently commissioned the community college to do the necessary training.

Technical Information and Advisory Services (continued)

- A bakery company's sales volumes had exceeded the company's production capacity. NAFTC, through its network of contacts, identified a potentially compatible company having excess production capacity. NAFTC staff advised the bakery company on the considerations related to entering a co-manufacturing agreement. The bakery entered a manufacturing arrangement, which has proven beneficial to both the companies involved.

- A rural meat processing facility was requested by federal regulatory authorities to increase microbiological surveillance of their meat products, especially for pathogenic organisms. Company management contacted NAFTC for assistance. NAFTC personnel contacted federal regulatory officials in Ottawa in order to obtain further insight into the request. Once the requirements were established, NAFTC supplied the company with information concerning biological standards as well as sampling and analyses plans necessary to comply with federal requirements.

- A Winnipeg manufacturer of cattle handling equipment decided to complete the development of a grain bin clean-out auger that had been created but was not yet out on the market. This auger reaches into the centre of the granary and another section of the auger travels around the inside of the granary picking up the remaining grain and transporting it outside. The portion of the auger that travels around inside the bin in driven by a small spiked tooth wheel driven by the auger shaft at about 600 rpm. The problem found during testing was that the spiked wheel turned too fast and dug holes in the granary floor. There was no room at the end of the auger to put a speed reducer. The company asked their ITA for advice. The ITA suggested that it made no difference if the spiked wheel turned slowly, and if it turned in a series of ratchet movements, the end result would be the same. The ITA then suggested the use of a one-way clutch bearing. The company designed a compact variable speed high reduction drive that uses a cam on the rotating auger to bump an arm on a ratchet that drives the spiked wheel a tiny amount with each revolution of the auger. Production of the clean-out auger starts this year.

THE BOARD OF DIRECTORS

Mr. Russ Hood (Chairman)
UMA Group

Dr. John Wade (Vice Chair)
Department of Medicine, UofM

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MRC wishes to thank the following Board members whose term of service ended during 1990/91:

Mr. Dave Anton
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Institute for Technological Development
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D. Zvanovec, Dip. Mech. Tech.

Advanced Industrial Materials Program

K. Tandon, B.Sc. (Met. E.), Ph.D., P.Eng.

Environmental Monitoring and Analytical Chemistry

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NATIONAL AGRI-FOOD

TECHNOLOGY CENTRE

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Food Product Development
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K. Andrews, B.H.Ecol.
M. Flemington
J. Meseyton, B.H.Ec.
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Food Technology
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C. Johnson
P. Moberly
L. Murray, B.Sc.
S. Ryan, B.Sc.
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Agri-Food Biotechnology Program
J. Zawistowski, Ph.D.

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National Agri-Food Technology Centre
810 Phillips Street, P.O. Box 1240
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Advanced Industrial Materials Program
Mechanical Engineering Department
University of Manitoba
Winnipeg, Manitoba
Canada R3T 2N2
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Agri-Food Biotechnology Program
Food Science Department
University of Manitoba
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Fax: (204) 983-5785

Institute for Technological Development
Faculty of Engineering
University of Manitoba
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The Manitoba Research Council is a member of the Association of Provincial Research Organizations Inc.

MANITOBA RESEARCH COUNCIL

MANAGEMENT REPORT

The accompanying financial statements of the Manitoba Research Council are the responsibility of management and have been prepared in accordance with the accounting policies stated in the financial statements. These accounting policies have been applied on a basis consistent with that of the preceding year. In management's opinion, the financial statements have been properly prepared within reasonable limits of materiality, incorporating management's best judgement regarding all necessary estimates and all other data available up to June 15, 1992.

Management maintains internal controls to provide reasonable assurance of the reliability and accuracy of the financial information and that the assets of the Manitoba Research Council are properly safeguarded.

The responsibility of the Provincial Auditor is to express an independent, professional opinion on whether the financial statements of the Manitoba Research Council are fairly presented in accordance with the accounting policies stated in the financial statements. The Auditor's Report outlines the scope of the audit examination and provides the audit opinion.

On behalf of Management

Dr. J. K. Reichert
Acting President

W. Kinnear, C.A.
Acting Vice-President,
Finance & Administration

R. Osato
Manager,
Finance & Administration

June 15, 1992
Date

92060402.RO

Office of
the Provincial Auditor

905 - 386 Broadway
Winnipeg, Manitoba, CANADA
R3C 3R6

AUDITOR'S REPORT

To the Legislative Assembly of Manitoba

We have audited the balance sheet of The Manitoba Research Council as at March 31, 1992 and the statement of revenue and expenditure and funds retained and the statement of changes in cash resources for the year then ended. These financial statements are the responsibility of the Council's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In our opinion, these financial statements present fairly, in all material respects, the financial position of the Council as at March 31, 1992 and the results of its operations and the changes in its cash resources for the year then ended in accordance with generally accepted accounting principles.

W. Johnson

Winnipeg, Manitoba
June 15, 1992

W. A. Johnson, CA
A/Assistant Provincial Auditor

THE MANITOBA RESEARCH COUNCIL — EXHIBIT A

Balance Sheet
as at March 31, 1992
(with 1991 figures for comparison)

ASSETS	1992	1991
Current		
Cash	$ 4,500	$ 7,000
Funds on deposit with the Minister of Finance	793,146	442,162
Accounts receivable		
Trade	228,134	461,839
Government of the Province of Manitoba	3,854	204,556
Prepaid expenses	32,633	49,480
	1,062,267	1,165,037
Capital assets (Notes 2a and 3)	447,314	459,393
	$1,509,581	$1,624,430

LIABILITIES AND FUNDS RETAINED		
Current		
Accounts payable and accrued liabilities	$ 471,973	$ 665,682
Current portion of loan payable	-	17,341
Deferred revenue	62,456	10,121
	534,429	693,144
Loan payable (Note 5)	-	23,488
Funds retained, Exhibit B	975,152	907,798
	$1,509,581	$1,624,430

The accompanying notes are an integral part of these financial statements.

THE MANITOBA RESEARCH COUNCIL

EXHIBIT B

Statement of Revenue and Expenditure
and Funds Retained
for the year ended March 31, 1992
(with 1991 figures for comparison)

	1992	1991
Revenue		
Grants from the Province of Manitoba	$2,000,000	$2,714,700
Contracts	2,268,987	2,079,599
Contribution of services	195,840	74,400
Interest	62,666	117,551
Sundry	27,697	17,741
Total revenue	4,555,190	5,003,991
Expenditure, Schedule 1	4,487,836	5,739,573
Excess (deficiency) of revenue over expenditure	67,354	(735,582)
Funds retained, beginning of year		
As previously reported	705,433	1,643,380
Adjustment for recovery of employee termination costs (Note 4)	202,365	-
Funds retained, beginning of year, as restated	907,798	1,634,380
Funds retained, end of year	$ 975,152	$ 907,798

The accompanying notes are an integral part of these financial statements

THE MANITOBA RESEARCH COUNCIL

EXHIBIT C

Statement of Changes in Cash Resources
for the year ended March 31, 1992
(with 1991 figures for comparison)

	1992	1991
Operating activities		
Excess (deficiency) of revenue over expenditure	$ 67,354	$ (735,582)
Items not involving cash		
Amortization	87,547	106,395
Gain on sale of capital assets	(6,515)	(985)
Write-off of obsolete software	-	27,896
Net change in non-cash working capital balances		
Accounts receivable	434,407	(265,950)
Prepaid expenses	16,847	8,486
Accounts payable and deferred revenue	(141,374)	170,416
	458,266	(689,324)
Financing activity		
Loan repayment (Note 5)	(40,829)	(15,756)
Investing activities		
Capital asset additions (less government grant of $271,770; 1991 - NIL)	(75,468)	(207,415)
Proceeds from disposal of capital assets	6,515	2,150
	(68,953)	(205,265)
Increase (decrease) in cash and funds on deposit	348,484	(910,345)
Cash and funds on deposit, beginning of year	449,162	1,359,507
Cash and funds on deposit, end of year	$ 797,646	$ 449,162

The accompanying notes are an integral part of these financial statements.

THE MANITOBA RESEARCH COUNCIL

SCHEDULE 1

Schedule of Expenditure
for the year ended March 31, 1992
(with 1991 figures for comparison)

	1992	1991
Expenditure		
Advertising and promotion	$ 49,405	$ 165,708
Amortization	87,547	106,395
Audit fees	25,485	20,260
Bad debts	704	23,974
Building maintenance and repairs	81,992	94,201
Computer related expenses	147,822	165,015
Equipment - rentals, maintenance and repairs	63,180	51,520
Fees - memberships, seminars, customs	24,919	119,318
Heating and utilities	92,173	97,599
Interest on loan	4,564	6,164
Laboratory supplies	198,750	200,798
Library - consultants and publications	54,405	53,184
Miscellaneous	1,513	1,497
Postage, delivery and telephone	91,219	135,811
Printing and stationery supplies	33,223	56,662
Purchased testing services	37,651	64,047
Real estate rental and property taxes	351,595	338,535
Salaries and employee benefits	3,051,059	3,823,252
Staff transfer and relocation costs	8,480	46,197
Travel and transportation	82,150	169,436
	$4,487,836	$5,739,573

The accompanying notes are an integral part of these financial statements.

THE MANITOBA RESEARCH COUNCIL

Notes to Financial Statements for
the year ended March 31, 1992

1. Nature of Operations

The Manitoba Research Council was established in 1963 with the following objectives:

a) to promote and carry on research and scientific enquiries respecting agriculture, natural resources, industry or other segments of the economy of the province; and

b) to secure for Manitoba the benefits of research and scientific enquiries carried on elsewhere.

The Manitoba Research Council operates three laboratory facilities, two in Winnipeg and the other in Portage la Prairie. During 1992 MRC moved its Environmental and Analytical Chemistry Services to the W. M. Ward Technical Services Laboratory and changed the name of the Portage la Prairie facility to the National Agri-Food Technology Centre. Both laboratories continued to function as operations of the Manitoba Research Council.

Effective April 1, 1992, pending passage of Bill 9, the Economic Innovation and Technology Council Act, all of the Manitoba Research Council's activities will be continued under the name of Technology and Research Manitoba of the Economic Innovation and Technology Council. The newly formed Economic Innovation and Technology Council will provide ongoing direction and stewardship of the continued technological operations of the laboratory facilities.

2. Significant Accounting Policies

These financial statements are prepared in accordance with generally accepted accounting principles.

The significant accounting policies are as follows:

a) Capital assets are recorded at cost less Government grants received and accumulated amortization. Amortization is calculated on a straight-line basis at the following annual rates:

Automobiles	20%
Computer equipment	20%
Equipment	10%
Furniture and fixtures	10%
Computer software over $10,000	33 1/3%

b) Certain general and administrative services and facilities are provided by the Province of Manitoba at no cost to the Council. This contribution of services is recorded in the financial statements as revenue and as expenditure.

THE MANITOBA RESEARCH COUNCIL

Notes to Financial Statements for
the year ended March 31, 1992

3. Capital Assets

Capital assets owned by The Manitoba Research Council are summarized as follows:

	Cost	Government Grants Received	Accumulated Amortization	1992 Net Book Value	1991 Net Book Value
Automobiles	$ 20,000	$ 20,000	$ -	$ -	$ -
Computer Equipment	996,898	324,091	568,254	104,553	107,270
Equipment	4,441,363	1,818,639	2,294,022	328,702	342,936
Furniture and Fixtures	105,438	53,516	43,852	8,070	9,187
Computer Software	74,868	65,884	2,995	5,989	-
	$ 5,638,567	$ 2,282,130	$ 2,909,123	$ 447,314	$ 459,393

4. Recovery of Employee Termination Costs

In March, 1992 the Manitoba Research Council received a grant of $202,365 from the Department of Industry, Trade and Tourism under the Manitoba Government's 1991/92 Interim Reform and Workplace Adjustment Vote. This grant reimburses the Council for a portion of the employee termination costs incurred in 1991 and recorded as expenditures in 1991 during implementation of the restructuring plan. The amount of $202,365 has been retroactively applied to 1991, resulting in the restatement of the previously reported 1991 figures as follows:

a) Salaries and employee benefits have been decreased by $202,365
b) Deficiency of revenue over expenditure has been decreased by $202,365
c) Accounts receivable from the Government of the Province of Manitoba has been increased by $202,365

5. Loan Payable

The 10 year loan payable for leasehold improvements which would have matured May 1, 1993 was paid in February 1992.

6. Pension Plan

In accordance with provisions of The Civil Service Superannuation Act, employees of the Council are required to contribute to The Civil Service Superannuation Fund at prescribed rates for defined benefits. The Council is required to make contributions equal to the amount contributed to the Fund by employees. For 1992 the amount contributed by the Council was $141,030 (1991 - $176,302). Under this Act, the Council has no further pension liability.

THE MANITOBA RESEARCH COUNCIL

Notes to Financial Statements for
the year ended March 31, 1992

7. Lease Committment

Council has entered into a lease agreement for office premises for a term ending March 31, 1993. The basic annual rent is $168,996.

8. Comparative Figures

Comparative figures for the year ended March 31, 1991 have been restated to conform with the presentation adopted for the current year.